

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

**FOREST STAND IMPROVEMENT**  
**(Acre)**  
**CODE 666**

**DEFINITION**

The manipulation of species composition, stand structure, and stocking by cutting or killing selected trees and understory vegetation.

**PURPOSES**

- Improve understory forage production, aesthetics, wildlife habitat, recreation, and hydrologic conditions.
- To harvest forest products.
- To initiate forest stand regeneration.
- To achieve a combination of purposes.
- To increase the quantity and quality of forest products, e.g., sawtimber, veneer, wood fiber, poles, pilings, maple syrup, naval stores, nuts and fruits.
- To reduce the potential of damage from wildfire, pests, and moisture stress.
- To restore natural plant communities.
- To achieve a desired understory plant community.
- To improve wildlife habitat.
- To improve water conservation and yield.
- To achieve a desired level of crop tree stocking and density.
- To increase carbon storage in selected crop trees.
- Manage noxious woody plants.

**CONDITIONS WHERE PRACTICE APPLIES**

All forest lands where improvement of forest resources is needed.

**CRITERIA**

Preferred tree and understory species are identified and retained to achieve the intended purpose.

Spacing, density and amounts of preferred trees and understory species to be retained will follow established guidelines for the intended purposes. Such guidelines shall contain stocking in terms of basal area, spacing, or trees per acre by species and size class distribution.

Forest stand improvement activities shall be performed to minimize soil erosion, compaction, rutting, damage to remaining vegetation and hydrologic conditions.

Slash, debris and vegetative material left on the site after treatment will not present an unacceptable fire or pest hazard or interfere with the intended purpose.

Comply with applicable laws and regulations, including the state's Best Management Practices (BMPs).

Existing soils information should be utilized for forestry interpretations.

**CONSIDERATIONS**

Silvicultural objectives and harvest-regeneration strategies may change over time and may be limited by prior management.

Timing of treatment and retaining dead or dying trees will minimize impacts on nesting wildlife along with the disturbance of other seasonal wildlife activities.

Wildlife food and cover can be retained by minimal modifications to composition and spacing regardless of the purpose for treatment. Forested wildlife corridors can minimize fragmentation effects.

**A. Harvest Cutting**

In California harvesting is under the control of the State Board of Forestry.

The Forest Practice Rules as prescribed by the Forest Practice Act, and modified by individual counties, must be observed through a timber harvest plan or equivalent prepared by a registered professional forester, and approved by the California Board of Forestry.

Timber operations means the cutting of removal or both of timber or other solid wood forest products, including Christmas trees and firewood, from timberlands for commercial purposes.

Discuss alternative logging practices based on erosion hazard rating for soils.

### **B. Vegetation Management – Competing Vegetation Control**

Vegetative response is the determining factor indicating the success of a vegetation management practice. If increased forage is the objective, inability of forage species to take quick advantage of improved growing conditions by species may limit success. If improvement of wildlife habitat is the objective, planning should include specified levels of cover for individual species. If fuel load reduction is the objective, acceptable levels of woody plant control should be specified. If water quality improvement is the objective, reasonable chances of improving herbaceous cover while reducing woody cover should exist. When improved recreation and esthetic values are the objectives, descriptions of desired vegetation type distribution should be provided.

The control of grasses or other herbaceous plants may be accomplished by mechanical, chemical, biological, prescribed burning, or a combination of these methods.

Management following initial treatments must be specified during the planning process. Decision-makers must be aware of maintenance and management requirements to insure success and prolong the life of initial treatment.

Following initial application, some regrowth, resprouting, or reoccurrence should be expected. Spot treatment of individual plants or areas needing retreatment should be done as needed.

### **Target Species**

Primary species included under this practice are:

Juniper	( <u>Juniperus spp</u> )
Manzanita	( <u>Arctostaphylos spp</u> )
Ceanothus	( <u>Ceanothus spp</u> )
Sumac	( <u>Rhus spp</u> )
Shrub Oak	( <u>Quercus dumosa</u> )
Poison Oak	( <u>Toxicodendron diversilobum</u> )

Certain pesticides have been designated as restricted use pesticides by the Director, Department of Pesticides Regulation, California Environmental Protection Agency. Any restricted material, with certain exemptions, can be used and possessed for agricultural use only under the written permit of the County Agriculture Commissioner. Registration is a determination that the County Agricultural Commissioner may grant a possession and use permit for the California restricted material to certified commercial or private applicators.

All pesticides and containers that holds or has held pesticides will be stored, transported, handled, and disposed of in accordance with directions adopted by the Director, Department of Pesticide Regulation.

When chemicals are used, they must be used in accordance with label instructions to prevent water contamination from water-soluble chemicals and increased sediment yields from the reduction of non-target plant species.

### **Additional Criteria for Improving Wildlife Habitat.**

Activities will be planned and applied to meet the habitat requirements of wildlife. It will not adversely affect threatened or endangered species or their habitats.

### **Additional Criteria for Reducing Wildfire Hazards.**

Control undesirable woody plants in a manner that creates the desired plant community and reduces wildfire hazard.

### **C. Improvement Cutting**

In developing the intermediate cuts before the final harvest cut, use a spacing guide which leaves a varying number of trees, depending upon site indices and

average diameter class. Use spacing guide where this information is available.

Clients may only want to thin one time. If the stand exceeds 5 inches average diameter an alternative is to increase the D+X spacing to that for a ten-inch diameter tree. Clients need to be aware that this may require more maintenance of the understory and pruning to maintain satisfactory growth and develop quality material.

Leave healthy, full crowned, well-formed trees.

In mixed stands, favor the best adapted and highest quality species growing on the site.

Thin the highest site indices first.

Remove trees in the following categories: Crooked, dead or dying, diseased and injured.

The best time for thinning to avoid Ips beetle damage is September through April.

Discuss proper slash disposal, either by lopping and scattering, chipping, piling and burning, or by controlled burns.

Slash disposal, cutting permits, and use of power equipment should comply with the respective state laws.

The minimum sized tree for a saw log is 10 inch D.B.H. The log must be 10 feet long with a minimum diameter of 6 inches on the small end.

Ponderosa, Jeffrey, Lodgepole pines, Douglas-fir, red fir, and white fir can sometimes be marketed for stud logs, biomass, firewood, poles, and pulp when they reach a size that will cut out pieces 8 feet long with a 5 inch top.

On areas with recreational values, denser or more open stands may be desired. On-site inspection will be necessary before specifications can be given.

In recreational areas it would be desirable to leave some large picturesque hardwoods and an occasional misshapen conifer. Girdling or poisoning probably will not be feasible because of the creation of unsightly snag areas.

For wildlife dens, it is desirable to leave an occasional hollow tree, and sometimes a dead snag. These should

not be left, however, if they are a hazard to either animals or people, or if they are a severe fire hazard.

Hardwoods have high food value for wildlife. Not every hardwood should be eliminated from a stand of conifers. They serve as nurse trees for more desirable conifers. This should be taken into consideration in any weeding operation. Those that are not interfering, or are interfering with only one or two conifers should be left standing.

Develop an adequate and permanent road system and permanent landings. Soil compaction should be considered in the design of the transportation and harvesting system.

Fell trees on an angle toward the permanent yarding trails and roads.

The method, felling direction and timing of tree cutting for harvesting shall facilitate efficient and safe tree removal and protect riparian zones, unique areas, and structures.

Discuss alternative logging practices based on erosion hazard rating for the soils.

Discuss the establishment of buffer zones along streams and around mountain meadows.

Include additional practices that will minimize soil erosion and give maximum watershed protection, such as:

(1) 394 Firebreak

(2) 655 Forest Harvest Trails and Landings

### **Water Quantity**

The majority of water in the mountain regions comes from this area. Managing the stand will affect water quantity.

1. Effects on the components of the water budget.
2. Effects on the other water uses or users.

### **Water Quality**

Quality of water as it comes from the timberland is monitored and regulated by the Department of Water Resources through state water quality laws, and 208 non-point source legislation.

This practice may cause a temporary increase in erosion rates and sediment yield due to timbering operations. If chemicals are used to control unwanted trees, vines and shrubs, the potential for surface and/or ground water contamination exists. The degree of hazard depends upon the type and amounts of chemical applied, timing of application, and the distance to the receiving waters. Sixty percent of the tree's nitrogen content is contained in the slash.

1. Effects on erosion and the movement of sediment and soluble and sediment-attached substances carried by runoff or ground water recharge.
2. Effects of pesticides on surface or ground water quality.

### **Endangered Species Considerations**

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS' objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species.

If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that critical periods, such as spawning, eggs in gravels, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds

that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

### **Cultural Resources Considerations**

Determine if installation of this practice with any others proposed will have any effect on any cultural resources. NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. GM 420, Part 401, the California Environmental Handbook and the training for the California Environmental Assessment Worksheet specify how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information, about cultural resources. The Environmental Handbook is online at [www.ca.nrcs.usda.gov/rts/rts.html](http://www.ca.nrcs.usda.gov/rts/rts.html).

## **PLANS AND SPECIFICATIONS**

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

### **Specifications Guide**

Specifications shall be based on soil interpretations for an area and shall include species to be favored for better growth; spacing after thinning or weeding; methods of removal; best season for cutting or treating chemically; disposing of slash; and special treatments, if needed, to forestall the spread of disease, fungi, or insects. If beauty or wildlife habitat are considerations, specify the species to be favored, how many of each are wanted, and where to leave them shall be indicated.

For herbaceous species; (1) dates of growth periods for effective treatment; (2) acceptable alternative materials, equipment, and methods; (3) types of areas, patterns of vegetation, and kinds and amounts that should be favored (left) for wildlife habitat, natural beauty, and recreation; (4) maintenance and management needed to follow management treatment.

## **OPERATION AND MAINTENANCE**

There are a number of maintenance items that are necessary to maintain a healthy stand, and to achieve the benefits for which the plantings were established. A maintenance plan will be prepared that addresses the appropriate items:

1. pruning
2. weed control
3. water and wind erosion control
4. water quality management
5. pest management
6. grazing management
7. harvesting methods
8. wildlife habitat